



OPERATOR'S MANUAL

ANGLE SWEEPER S26 / S30 Series – CTH / MRH

**FOR
TURF MOWERS,
COMPACT TRACTORS**



SERIAL NUMBER: _____

MODEL NUMBER: _____

Manual Number: 51-4180
Date: December 2018
Serial Number: 0906001 & UP
Rev. 5

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PREFACE

GENERAL COMMENTS

Congratulations on the purchase of your new product! This product was carefully designed and manufactured to give you many years of dependable service. Only minor maintenance (such as cleaning and lubricating) is required to keep it in top working condition. Be sure to observe all maintenance procedures and safety precautions in this manual and on any safety decals located on the product and on any equipment on which the attachment is mounted.

This manual has been designed to help you do a better, safer job. Read this manual carefully and become familiar with its contents.

WARNING! Never let anyone operate this unit without reading the "Safety Precautions" and "Operating Instructions" sections of this manual.



Always choose hard, level ground to park the vehicle on and set the brake so the unit cannot roll.

Unless noted otherwise, right and left sides are determined from the operator's control position when facing forward.

NOTE: The illustrations and data used in this manual were current (according to the information available to us) at the time of printing, however, we reserve the right to redesign and change the attachment as may be necessary without notification.

BEFORE OPERATION

The primary responsibility for safety with this equipment falls to the operator. Make sure the equipment is operated only by trained individuals that have read and understand this manual. If there is any portion of this manual or function you do not understand, contact your local authorized dealer or the manufacturer to obtain further assistance. Keep this manual available for reference. Provide the manual to any new owners and/or operators.

SAFETY ALERT SYMBOL



This is the "Safety Alert Symbol" used by this industry. This symbol is used to warn of possible injury. Be sure to read all warnings carefully. They are included for your safety and for the safety of others working with you.

SERVICE

Use only manufacturer replacement parts. Substitute parts may not meet the required standards.

Record the model and serial number of your unit on the cover of this manual. The parts department needs this information to insure that you receive the correct parts.

SOUND AND VIBRATION

Sound pressure levels and vibration data for this attachment are influenced by many different parameters: some items are listed below (not inclusive):

- prime mover type, age, condition, with or without cab enclosure and configuration
- operator training, behavior, stress level
- job site organization, working material condition, environment

Based on the uncertainty of the prime mover, operator, and job site, it is not possible to get precise machine and operator sound pressure levels or vibration levels for this attachment.

NOTE: A list of all Paladin Patents can be found at <http://www.paladinattachments.com/patents.asp>.

SAFETY STATEMENTS



THIS SYMBOL BY ITSELF OR WITH A WARNING WORD THROUGHOUT THIS MANUAL IS USED TO CALL YOUR ATTENTION TO INSTRUCTIONS INVOLVING YOUR PERSONAL SAFETY OR THE SAFETY OF OTHERS. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN INJURY OR DEATH.



DANGER

THIS SIGNAL WORD INDICATES A HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, WILL RESULT IN DEATH OR SERIOUS INJURY.



WARNING

THIS SIGNAL WORD INDICATES A HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY.



CAUTION

THIS SIGNAL WORD INDICATES A HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN MINOR OR MODERATE INJURY.

NOTICE

NOTICE IS USED TO ADDRESS PRACTICES NOT RELATED TO PHYSICAL INJURY.

GENERAL SAFETY PRECAUTIONS

WARNING!

READ MANUAL PRIOR TO INSTALLATION



Improper installation, operation, or maintenance of this equipment could result in serious injury or death. Operators and maintenance personnel should read this manual, as well as all manuals related to this equipment and the prime mover thoroughly before beginning installation, operation, or maintenance. **FOLLOW ALL SAFETY INSTRUCTIONS IN THIS MANUAL AND THE PRIME MOVER'S MANUAL(S).**



READ AND UNDERSTAND ALL SAFETY STATEMENTS

Read all safety decals and safety statements in all manuals prior to operating or working on this equipment. Know and obey all OSHA regulations, local laws, and other professional guidelines for your operation. Know and follow good work practices when assembling, maintaining, repairing, mounting, removing, or operating this equipment.



KNOW YOUR EQUIPMENT

Know your equipment's capabilities, dimensions, and operations before operating. Visually inspect your equipment before you start, and never operate equipment that is not in proper working order with all safety devices intact. Check all hardware to ensure it is tight. Make certain that all locking pins, latches, and connection devices are properly installed and secured. Remove and replace any damaged, fatigued, or excessively worn parts. Make certain all safety decals are in place and are legible. Keep decals clean, and replace them if they become worn or hard to read.

GENERAL SAFETY PRECAUTIONS

WARNING!



PROTECT AGAINST FLYING DEBRIS

Always wear proper safety glasses, goggles, or a face shield when driving pins in or out, or when any operation causes dust, flying debris, or any other hazardous material.

WARNING!



LOWER OR SUPPORT RAISED EQUIPMENT

Do not work under raised booms without supporting them. Do not use support material made of concrete blocks, logs, buckets, barrels, or any other material that could suddenly collapse or shift positions. Make sure support material is solid, not decayed, warped, twisted, or tapered. Lower booms to ground level or on blocks. Lower booms and attachments to the ground before leaving the cab or operator's station.

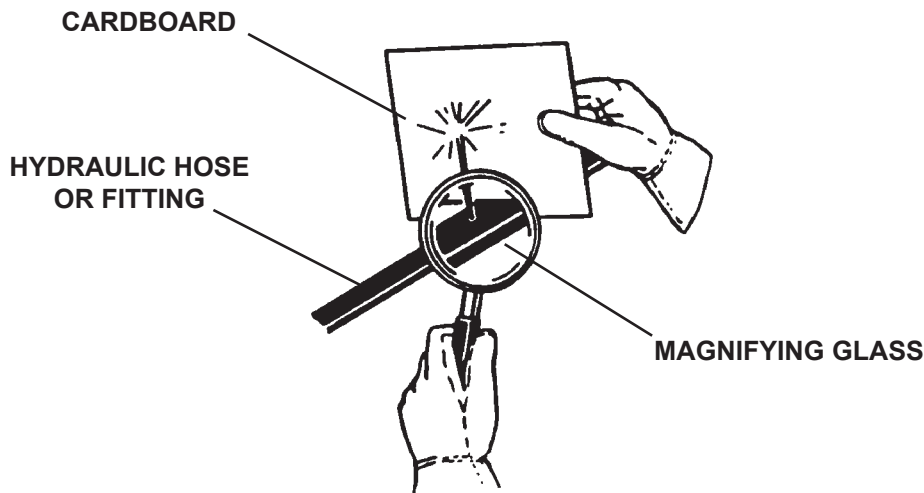
WARNING!



USE CARE WITH HYDRAULIC FLUID PRESSURE

Hydraulic fluid under pressure can penetrate the skin and cause serious injury or death. Hydraulic leaks under pressure may not be visible. Before connecting or disconnecting hydraulic hoses, read your prime mover's operator's manual for detailed instructions on connecting and disconnecting hydraulic hoses or fittings.

- Keep unprotected body parts, such as face, eyes, and arms as far away as possible from a suspected leak. Flesh injected with hydraulic fluid may develop gangrene or other permanent disabilities.
- If injured by injected fluid, see a doctor at once. If your doctor is not familiar with this type of injury, ask him to research it immediately to determine proper treatment.
- Wear safety glasses, protective clothing, and use a piece of cardboard or wood when searching for hydraulic leaks. **DO NOT USE YOUR HANDS!** SEE ILLUSTRATION.



GENERAL SAFETY PRECAUTIONS

WARNING!



DO NOT MODIFY MACHINE OR ATTACHMENTS

Modifications may weaken the integrity of the attachment and may impair the function, safety, life, and performance of the attachment. When making repairs, use only the manufacturer's genuine parts, following authorized instructions. Other parts may be substandard in fit and quality. Never modify any ROPS (Roll Over Protective Structure) or FOPS (Falling Object Protective Structure) equipment or device. Any modifications must be authorized in writing by the manufacturer.

WARNING!



SAFELY MAINTAIN AND REPAIR EQUIPMENT

- Do not wear loose clothing or any accessories that can catch in moving parts. If you have long hair, cover or secure it so that it does not become entangled in the equipment.
- Work on a level surface in a well-lit area.
- Use properly grounded electrical outlets and tools.
- Use the correct tools for the job at hand. Make sure they are in good condition for the task required.
- Wear the protective equipment specified by the tool manufacturer.



SAFELY OPERATE EQUIPMENT

Do not operate equipment until you are completely trained by a qualified operator in how to use the controls, know its capabilities, dimensions, and all safety requirements. See your machine's manual for these instructions.

- Keep all step plates, grab bars, pedals, and controls free of dirt, grease, debris, and oil.
- Never allow anyone to be around the equipment when it is operating.
- Do not allow riders on the attachment or the prime mover.
- Do not operate the equipment from anywhere other than the correct operator's position.
- Never leave equipment unattended with the engine running, or with this attachment in a raised position.
- Do not alter or remove any safety feature from the prime mover or this attachment.
- Know your work site safety rules as well as traffic rules and flow. When in doubt on any safety issue, contact your supervisor or safety coordinator for an explanation.

WARNING!



CALIFORNIA PROPOSITION 65 WARNING.

This product may contain a chemical known to the state of California to cause cancer, or birth defects or other reproductive harm. www.P65Warnings.ca.gov

EQUIPMENT SAFETY PRECAUTIONS

WARNING!



KNOW WHERE UTILITIES ARE

Observe overhead electrical and other utility lines. Be sure equipment will clear them. When digging, call your local utilities for location of buried utility lines, gas, water, and sewer, as well as any other hazard you may encounter.

WARNING!



EXPOSURE TO RESPIRABLE CRYSTALLINE SILICA DUST ALONG WITH OTHER HAZARDOUS DUSTS MAY CAUSE SERIOUS OR FATAL RESPIRATORY DISEASE.

It is recommended to use dust suppression, dust collection and if necessary personal protective equipment during the operation of any attachment that may cause high levels of dust.

WARNING!



REMOVE PAINT BEFORE WELDING OR HEATING

Hazardous fumes/dust can be generated when paint is heated by welding, soldering or using a torch. Do all work outside or in a well ventilated area and dispose of paint and solvent properly. Remove paint before welding or heating.

When sanding or grinding paint, avoid breathing the dust. Wear an approved respirator. If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.

WARNING!



END OF LIFE DISPOSAL

At the completion of the useful life of the unit, drain all fluids and dismantle by separating the different materials (rubber, steel, plastic, etc.). Follow all federal, state and local regulations for recycling and disposal of the fluid and components.



OPERATING THE SWEEPER

- Do not exceed the lifting capacity of your prime mover.
- Operate only from the operator's station.
- When traveling on rough terrain, reduce speed to avoid "bouncing" the sweeper. Loss of steering can result.
- When operating on slopes, drive up and down, not across. Avoid steep hillside operation, which could cause the prime mover to overturn.
- Reduce speed when driving over rough terrain, on a slope, or turning, to avoid overturning the vehicle.
- An operator must not use drugs or alcohol, which can change his or her alertness or coordination. An operator taking prescription or over-the-counter drugs should seek medical advice on whether or not he or she can safely operate equipment.
- Before exiting the prime mover, lower the attachment to the ground, apply the brakes, turn off the prime mover's engine and remove the key.
- Never lift the lowest portion of the attachment plate higher than 5' above the ground.
- Do not lock the auxiliary hydraulics of your prime mover in the "ON" position.

EQUIPMENT SAFETY PRECAUTIONS



TRANSPORTING THE SWEEPER

- Travel only with the attachment in a safe transport position to prevent uncontrolled movement. Drive slowly over rough ground and on slopes.
- When transporting on a trailer: Secure attachment at recommended tie down locations using tie down accessories that are capable of maintaining attachment stability.
- When driving on public roads use safety lights, reflectors, Slow Moving Vehicle signs etc., to prevent accidents. Check local government regulations that may affect you.
- Do not drive close to ditches, excavations, etc., cave in could result.
- Do not smoke when refueling the prime mover. Allow room in the fuel tank for expansion. Wipe up any spilled fuel. Secure cap tightly when done.



MAINTAINING THE SWEEPER

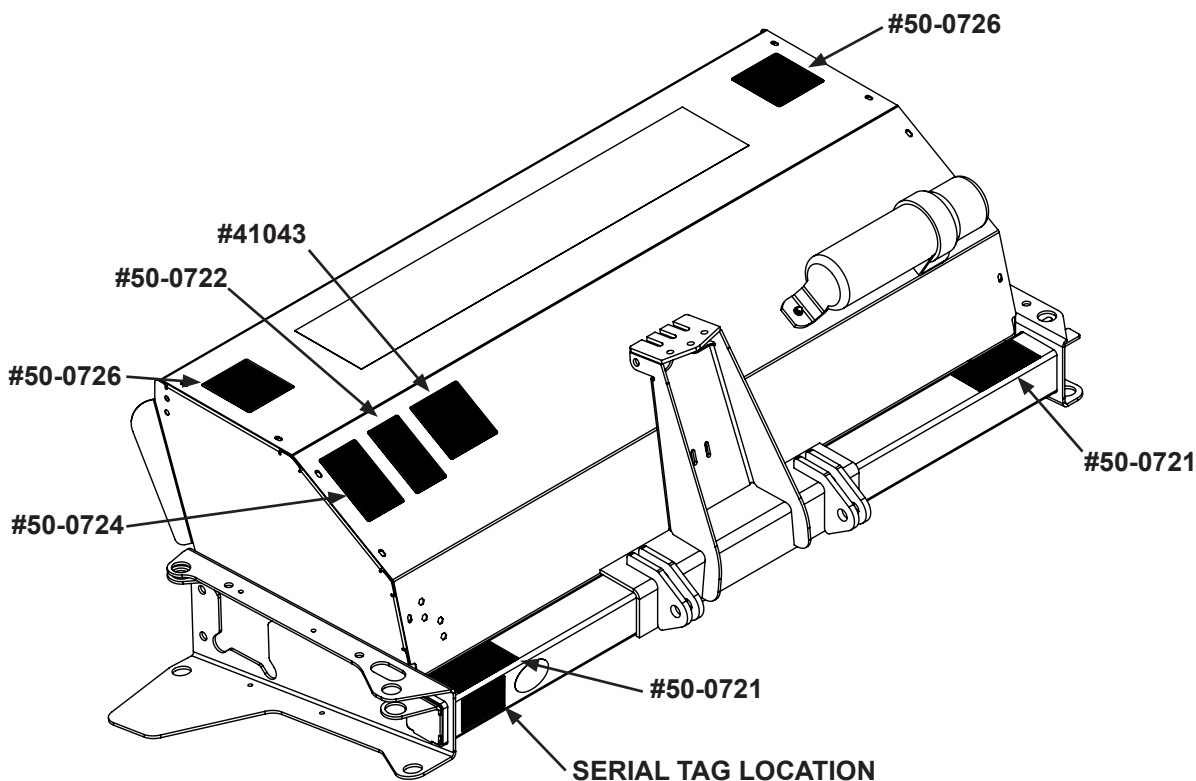
- Before performing maintenance lower the attachment to the ground, apply the brakes, turn off the engine and remove the key.
- Never perform any work on the attachment unless you are authorized and qualified to do so. Always read the operator service manuals before any repair is made. After completing maintenance or repair, check for correct functioning of the attachment. If not functioning properly, always tag “DO NOT OPERATE” until all problems are corrected.
- Worn, damaged, or illegible safety decals must be replaced. New safety decals can be ordered from Paladin.
- Never make hydraulic repairs while the system is under pressure. Serious personal injury or death could result.
- Never work under a raised attachment.

DECALS

DECAL PLACEMENT

GENERAL INFORMATION

The diagram on this page shows the location of the decals used on your attachment. The decals are identified by their part numbers, with reductions of the actual decals located on the following page. Use this information to order replacements for lost or damaged decals. Be sure to read all decals before operating the attachment. They contain information you need to know for both safety and product longevity.



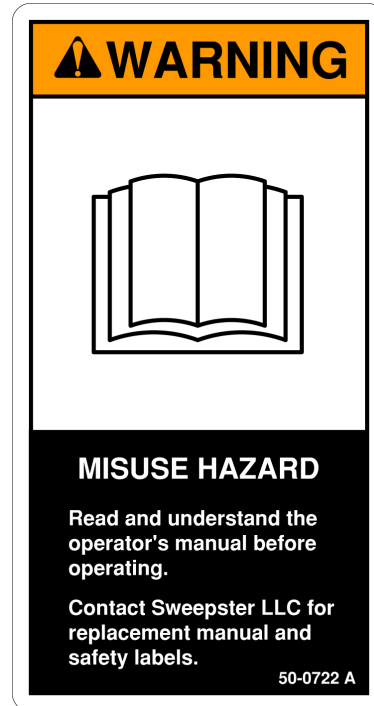
IMPORTANT: Keep all safety decals clean and legible. Replace all missing, illegible, or damaged safety decals. When replacing parts with safety decals attached, the safety decals must also be replaced. Safety decals are available, free of charge, from your local dealer or Paladin.

REPLACING SAFETY DECALS: Clean the area of application with nonflammable solvent, then wash the same area with soap and water. Allow the surface to fully dry. Remove the backing from the safety decal, exposing the adhesive surface. Apply the safety decal to the position shown in the diagram above and smooth out any bubbles.

DECALS



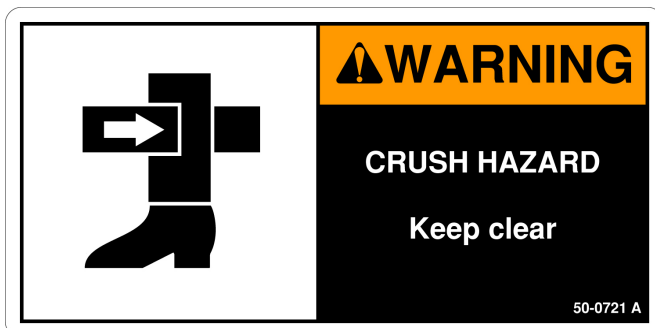
41043 WARNING!
HAZARDOUS DUST



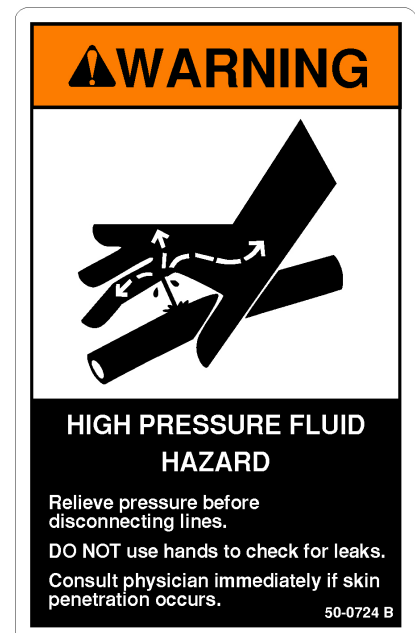
50-0722 WARNING! MISUSE
HAZARD



50-0726 WARNING! FLYING
OBJECTS & ENTANGLEMENT



50-0721 WARNING! CRUSH HAZARD



50-0724 WARNING! HIGH
PRESSURE FLUID HAZARD

NOTE: CONTACT YOUR LOCAL DEALER FOR MODEL NUMBER AND LOGO DECALS

INSTALLATION

INSTALLATION

Install the mounting assembly to the swing assembly according to the instructions included with the mounting kit for you application.

WARNING! To avoid personal injury, make sure mounting/swing assembly is securely latched to the attachment mechanism of your unit. Failure to do so could result in separation of the attachment from the prime mover.

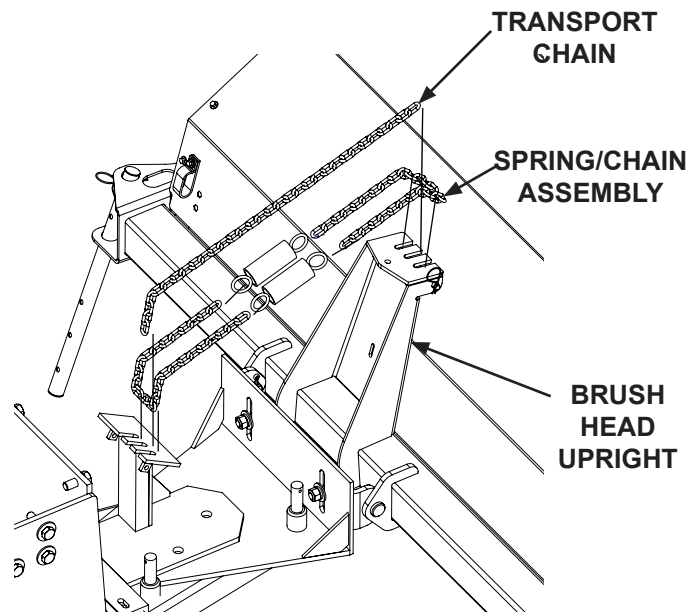


1. Position the brush head assembly in front of the mounting/swing assembly.
2. Attach the brush head assembly to the front of the swing plate with the two .50" carriage bolts, flat washers, lock washers and nuts.
3. Install the spring-chain assembly by following the instructions that apply to your mounting/swing assembly.

11-17174 SWING ASSEMBLY (SEE FIGURE #1)

1. Connect a spring to each end of one 26-link chain.
2. Connect the ends of the remaining 26-link chain to the other ends of the springs.
3. Loop one of the 26-link chains through the bracket on the mounting frame.
4. Loop the other end of the spring-chain assembly over the outside slots on the brush head upright.
5. **Transport Chain:** Install the 36-link transport chain by placing one end in the center slot of the brush head upright and the other end on the mounting frame bracket.
Transport Cable: Install cable through the center hole in the brush head upright. Loop the loose end around and secure it with a cable clamp. Attach the other end of the cable to the lift actuator system. (if the mounting assembly includes a welded link, thread the cable through the link before attaching to the lift actuator.)
6. Refer to "LEVELING"

FIGURE #1

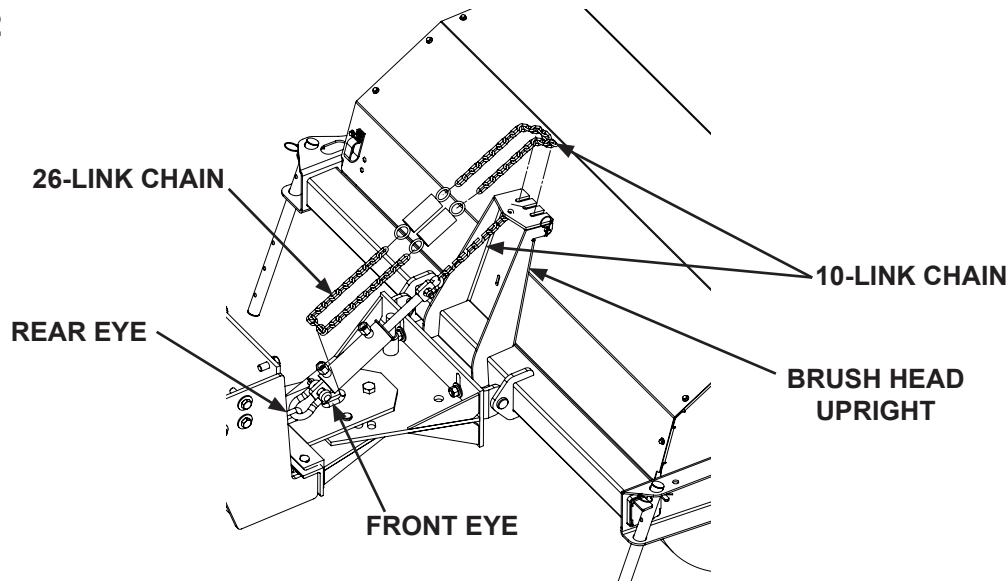


INSTALLATION

11-17176 SWING ASSEMBLY (WITH POWER PACK) & 11-17410 SWING ASSEMBLY (WITHOUT POWER PACK) (SEE FIGURE #2)

1. Connect a spring to each end of a 10-link chain.
2. Pass a 26-link chain through the front eye on the swing assembly and connect onto each spring.
3. Loop the other end of the spring-chain assembly over the outside slots on the brush head upright.
4. Attach the remaining 10-link chain to the rod end of the cylinder assembly using one of the shackles provided. Attach the other end to the center slot on the brush head upright.
5. Attach the barrel end of the cylinder assembly to the rear eye of the swing assembly with the remaining shackle.
6. Connect the adapter fitting and hose to the port on the rod end of the cylinder, and the vent fitting and hose to the port on the barrel end.
7. Refer to "LEVELING"

FIGURE #2



11-17432 SWING ASSEMBLY (SEE FIGURE #3)

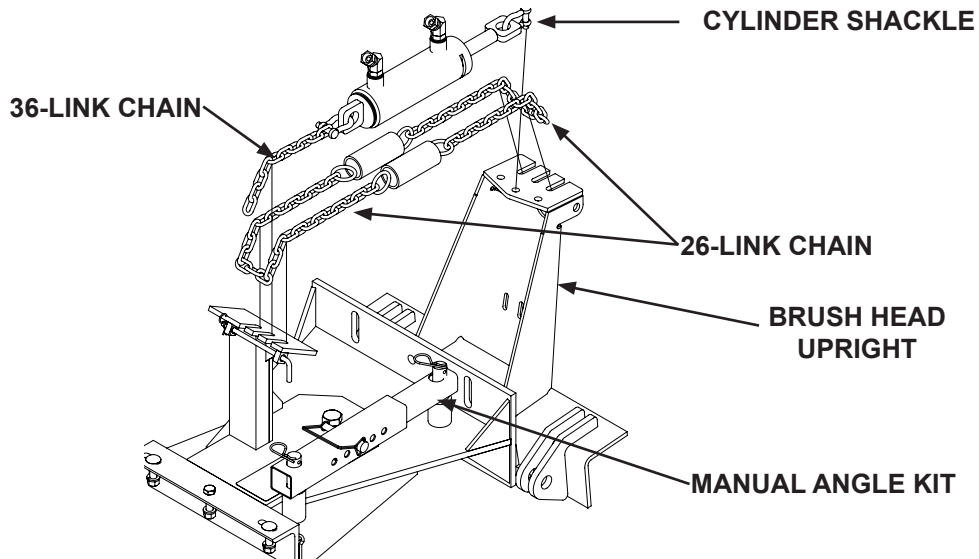
1. Connect a spring to each end of a 26-link chain.
2. Connect the ends of the remaining 26-link chain to the other ends of the springs.
3. Loop one of the 26-link chains through the bracket on the mounting frame.
4. Loop the other end of the spring-chain assembly over the outside slots on the brush head upright.
5. Install adapter fittings to both cylinder ports followed by the hoses and elbows provided. Install quick couplers onto the hoses.
6. Attach a shackle to the rod end of the cylinder and attach to the brush frame upright.
7. Attach the remaining shackle and 36-link chain to the barrel end of the cylinder assembly and then attach the 36-link chain to the center slot on the mounting upright.

NOTE: Completely collapse the cylinder to check for proper adjustment. The brush head assembly should lift 4" off the ground. If it does not: readjust the chain until 4" of lift is achieved.

8. Refer to "LEVELING"

INSTALLATION

FIGURE #3



FOR UNITS WITH ELECTRIC LIFT:

Refer to the instructions included with your mounting assembly.

1. Connect a spring to one end of each 7-link chain.
2. Connect the springs to the holes in the swing assembly upright and the chains to the outside slots on the brush head upright.
3. Install cable through the center hole in the brush head upright. Loop the loose end around and secure it with a cable clamp. Attach the other end of the cable through the center hole in the swing assembly upright. Loop the loose end around and secure it with a cable clamp.
4. Refer to "LEVELING"

ELECTRIC LIFT INSTALLATION

IMPORTANT: Not all sweepers include electric lift and some units include a bracket for mounting the lift switch. If your unit is equipped with an electric lift and a mounting bracket, refer to the instructions included with your mounting assembly to install the bracket.

To install the electric switch onto the prime mover dash:

1. Locate a convenient area on the prime mover dash to mount the lift switch. Disconnect the battery.

DANGER!



BATTERY ACID CAUSES SEVERE BURNS. Batteries contain sulfuric acid. Avoid contact with skin, eyes or clothing. Antidote: **EXTERNAL** - flush with water. **INTERNAL** - drink large quantities of water or milk. Follow with milk of magnesia, beaten eggs or vegetable oil. Call physician immediately. **EYES** - flush with water for 15 minutes and get prompt medical attention.

WARNING!



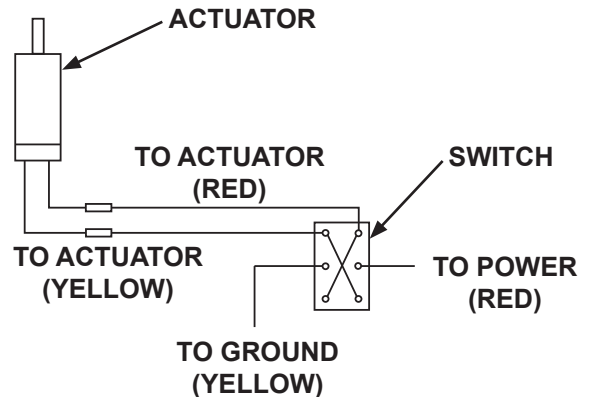
When working around batteries, remember that all of the exposed metal parts are "live". Never lay a metal object across the terminals because a spark or short circuit may result.

INSTALLATION

NOTICE: To avoid damage to the prime mover, before drilling verify that you will not drill into wires or other parts that could be damaged during the installation process.

2. Mark the lift switch location with a punch and drill a .50" hole. We recommend making a pilot hole using a punch or .25" bit.
3. Install the lift switch using the nut provided to secure in place.
4. Route the control wires and connector to the front of the prime mover. If necessary, secure the wires to the tractor frame to prevent them from hanging down and becoming damaged.

FIGURE #1



NOTICE: Route wires away from hot and/or moving parts to avoid wire damage.

5. Connect the red wire from the switch to the tractor power supply. Connect the yellow wire to the battery ground or tractor frame. See Figure #1

NOTICE: Add a 13 amp, 12 volt fuse to the power supply to avoid damage to the electric lift system if it is not already fused.

6. Mount the actuator on the mounting assembly if not previously installed.
7. Connect the wires from the lift switch to the actuator.
8. Verify wiring is correct and then reconnect the battery.

NOTE: Only use 14 gauge or heavier when replacing a wire.

MRH POWER PACK

Refer to the instructions included with your mounting assembly.

The hydraulic tank can be mounted in 1 of 2 positions:

1. On 3-point arms
2. Above the 3-point hitch attachment

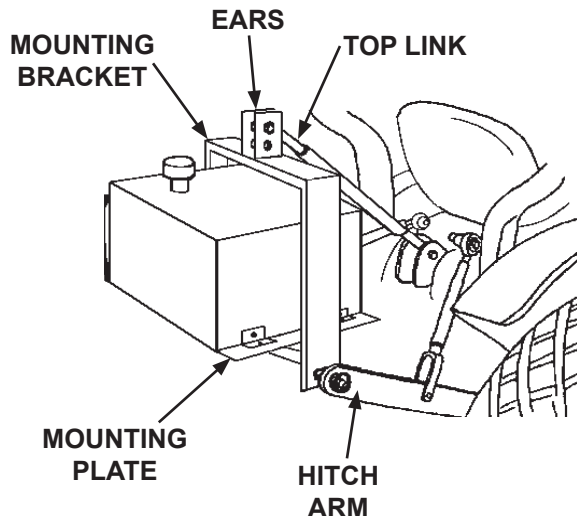
Mount the tank onto the 3-point arms unless you are using another 3-point attachment.

Then mount the tank above the 3-point hitch attachment.

ON 3-POINT HITCH ARMS. SEE FIGURE #2

1. Connect the mounting bracket to the hitch arms with hitch pins. Secure with ring pins.
2. Connect the top link to ears on the mounting bracket.
3. Fasten the two tank mounting plates to the mounting bracket's bottom channel. Use two, .50" carriage bolts, flat washers, lock washers and nuts.

FIGURE #2



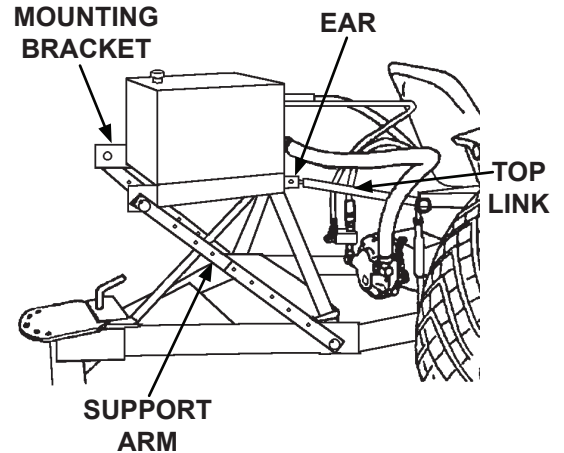
INSTALLATION

- Place the tank on top of the mounting plates and bolt in place with four, .38" carriage bolts, lock washers and nuts.
- Go to "PUMP & HOSES".

ABOVE 3-POINT HITCH. SEE FIGURE #3

- Connect the attachment, the mounting bracket ears and the top link.
- Assemble the support arms using four, .38" capscrews, flat washers, lock washers and nuts.
- Connect support arms to the hitch arms (with pins used on the hitch) and to the mounting bracket.
- Level mounting bracket from front to back and from left to right by adjusting the support arms.
- Install the tank on the mounting bracket with four carriage bolts.
- Go to "PUMP & HOSES".

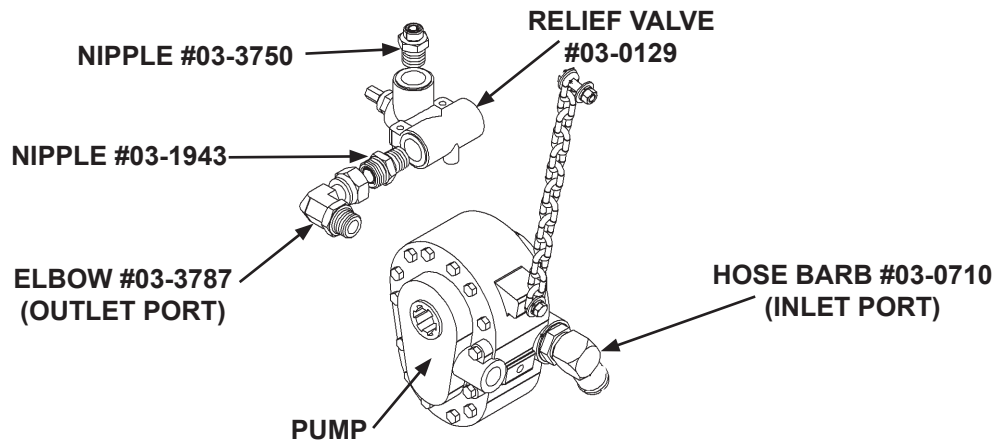
FIGURE #3



PUMP & HOSES

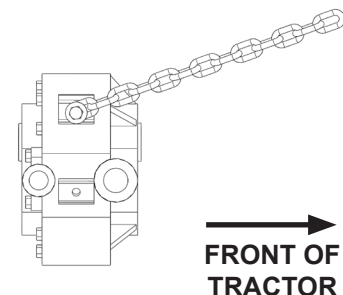
- Install the relief valve and fittings on the pump. See Figure #4
- Slide the pump onto the tractor PTO shaft. Make sure that the relief valve is on the left side.

FIGURE #4



- Fasten the 10-link chain to the bottom threaded hole on the right side of the pump. Bolt the other end of the chain to the tractor. The chain must be attached to a position on the tractor that is above and forward of the connection on the pump. The chain must also be taut. See Figure #5

FIGURE #5



NOTE: This chain holds the pump on the shaft and prevents it from spinning during operation.

INSTALLATION

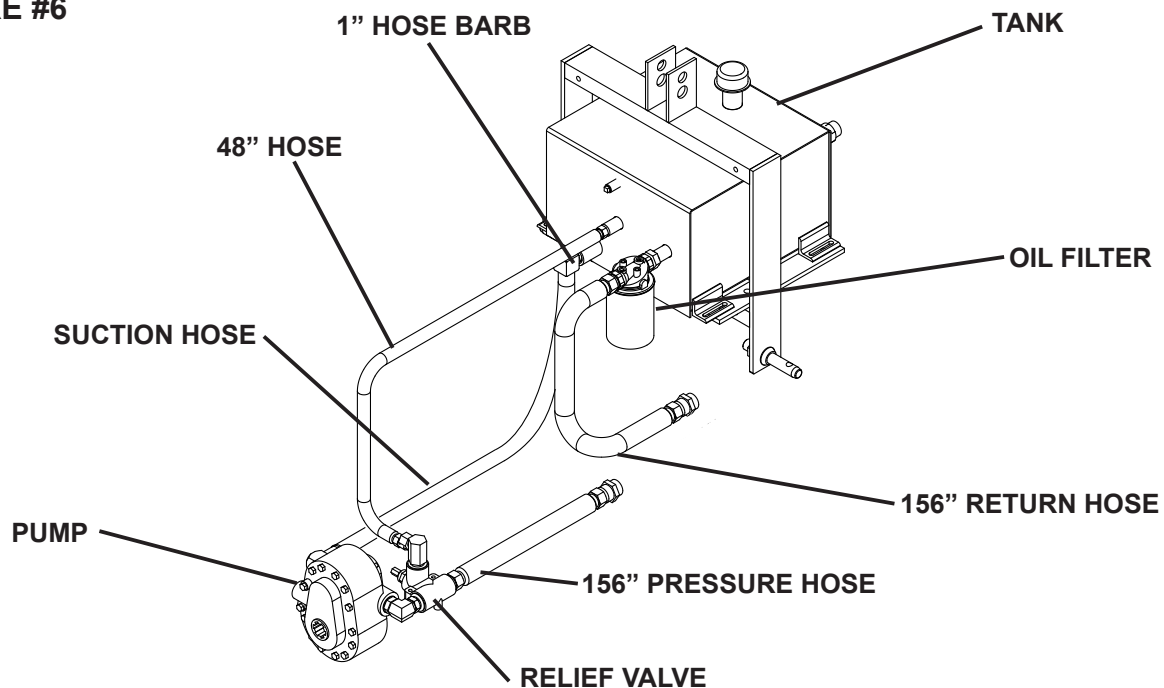
4. Install the 1" hose barb fitting into the port on the side of the tank. See Figure #6
5. Connect the suction hose to the hose barb on the pump inlet port and on the tank. Secure with hose clamps. See Figure #6

NOTICE! *If needed, cut the suction hose to length, leaving enough slack to allow the 3-point hitch to move and down.*

6. Connect the 48" hose to the center port on the tank and to the nipple on the relief valve.
7. Install nipple to the tank followed by oil filter.

NOTICE: *Make sure the arrow on the filter points towards the tank.*

FIGURE #6



8. Install the adapter to the oil filter.
9. Connect one of the 156" hoses to the filter assembly
10. Connect the remaining 156" hose to the relief valve.
11. Route both 156" hoses to the front of the tractor.
12. Install couplers on the 156" hoses.
13. Connect hoses included with the swing assembly (120" or 98") to the hydraulic motor.

DETACHING

1. Before exiting the prime mover, lower the attachment to the ground, apply the brakes, turn off the prime mover's engine, and remove the key.
2. Follow prime mover operator's manual to relieve pressure in the hydraulic lines.
3. Disconnect power and return hoses from the auxiliary hydraulics.
4. Follow your prime mover operator's manual for detaching (removing) an attachment.
5. Connect hydraulic couplers together or install caps to prevent contaminants from entering the hydraulic system. Store hoses off of the ground to help prevent damage.

OPERATION

INTENDED USE

This sweeper is designed solely for use in construction cleanup, road maintenance and similar operations. Use in any other way is considered contrary to intended use. Compliance with and strict adherence to operation, service and repair conditions as specified by the manufacturer, are essential elements of intended use.

STARTING AND STOPPING THE SWEEPER

The sweeper uses the prime mover hydraulic flow to operate. To start the brush, turn on the prime mover auxiliary hydraulics. To stop the brush, turn off the auxiliary hydraulic flow. To avoid motor damage, do not stop the sweeper at high engine speed. Decrease engine RPM before turning off the hydraulic flow.

TRAVEL DIRECTION

Travel should be in the forward direction and brush rotation always away from the operator.

BRUSH SPEED

To increase brush speed, increase prime mover RPM. Use the LOWEST speed needed to complete the job at hand. In general, half throttle provides the necessary engine speed.

RUN, SWING AND LIFT CONTROLS

Run, swing and lift functions vary according to how the unit is equipped. The sweeper controls are activated by switches on the control box. Refer to operation decal on control box.

MANUAL ANGLE

- Remove the lock pin from links.
- Position the brush head at the desired angle, aligning holes in the inner and outer link.
- Insert and close the lock pin.

HYDRAULIC ANGLE

- Start the prime mover.
- Engage the hydraulics.
- Position the brush head at the desired angle.

BEFORE OPERATING SWEEPER

- Adjust brush pattern for optimum sweeping performance.
- Learn sweeper and prime mover controls in an off-road location.
- Be sure you are in a safe area, away from traffic or other hazards.
- Check to make sure the attachment is securely latched to the attachment mechanism on your prime mover.
- Complete daily maintenance checklist. (See Maintenance Section)
- Remove all property that could be damaged by flying debris from sweeping area.
- Be sure all persons not operating the sweeper are clear of sweeper discharge area.
- Always wear proper apparel and PPE (personal protective equipment) for your work site.

OPERATION

DANGER! Avoid electrical shock. Stay away from overhead wires.



WHILE OPERATING SWEEPER

- When operating sweeper, adhere to all government rules, local laws and other professional guidelines for your sweeping application.
- Avoid excessive downward pressure on brush sections to prevent excessive wear. A 2 to 4 inch (5-10 cm) wide pattern is sufficient for most applications. Ensure that the sweeper is level to prevent uneven wear pattern.
- Before exiting the prime mover, lower the attachment to the ground, apply the brakes, turn off the prim mover's engine and remove the key.
- Minimize flying debris - use slowest rotating speed that will do the job.
- Keep hands, feet, hair and other loose clothing away from all moving parts.
- Leave all shields and safety equipment in place when operating sweeper and primer mover.
- Be aware of the extra weight and width a sweeper adds. Reduce travel speed accordingly. Keep in mind the center of gravity changes when an attachment is installed.
- When traveling on rough terrain, reduce speed to avoid "bouncing" the sweeper. Loss of steering can result.
- Never sweep toward people, buildings, vehicles or other objects that can be damaged by flying debris.
- Only operate sweeper from the operator's station of the prime mover. Only operate controls while the engine is running.
- Operate sweeper slowly in open area, check for proper operation of all controls and all protective devices. Report any needed repairs.

OPERATION

Carry the sweeper low to the ground so the operator has good visibility and stability. Avoid any sudden movements. Observe wind direction. Sweeping with the wind makes sweeping more effective and helps keep debris off the operator.

The terms *swing* and *angle* are used interchangeably.

Basic Sweeping Operation:

With the sweeper level and the brush pattern adjusted you are ready to begin sweeping.

1. Swing the brush head assembly in the direction that you want to direct debris.
2. Start the prime mover at an idle and raise the brush.
3. Engage the brush head and then lower it to the ground.
4. Increase prime mover engine RPM. Using the lowest speed needed to complete the job at hand.
5. Begin forward travel at 5 MPH (8 kph) or less.

OPERATION

WARNING! **AVOID SERIOUS INJURY.** Check for large objects that could harm operator or others if thrown by sweeper. Remove items before operating.



BRUSH PATTERN ADJUSTMENT

A properly leveled brush offers the best sweeper performance.

1. Move the sweeper to a dusty, flat surface.
2. Set the prime mover's parking brake. Leave the engine running.
3. Start the sweeper at a slow speed; then, lower it completely to the surface so the bristle tips touch the ground. Run the sweeper in a stationary position for 10 seconds.
4. Raise the sweeper and back away; switch off the engine and remove the key. The brush pattern left in the dust should be 2"-4" wide, running the length of the brush. See Figure #1.
5. If necessary, adjust the brush pattern with the spring-chain assembly. See Figure #2
 - a. Raise the sweeper.
 - b. Tighten the transport chain (See Figure #2) or lift cable and lower the sweeper so it supports weight.
 - c. Move the spring-chain forward in the swing assembly chain holder to lower the brush head assembly or backward in the holder to raise it.
6. Repeat steps 1-5 until the brush pattern is 2" - 4" wide

FIGURE #1

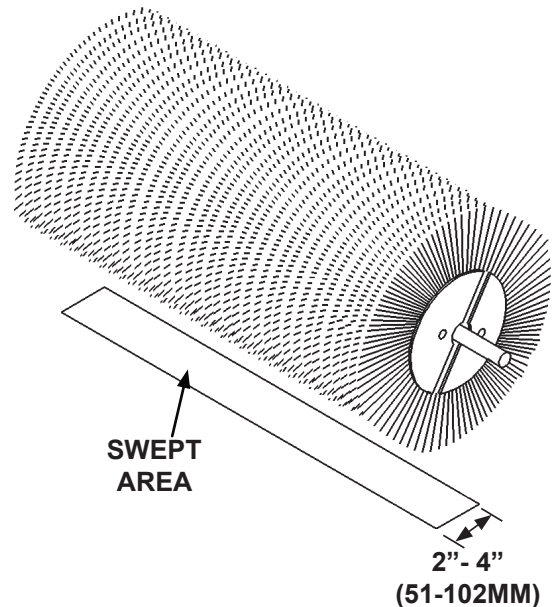
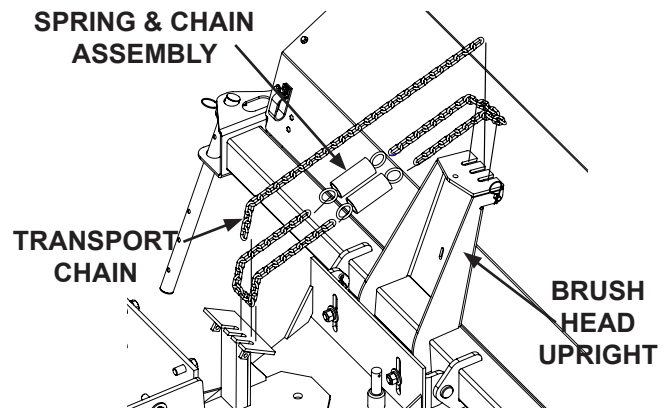


FIGURE #2



TRANSPORT CHAIN

NOTICE! *Units with a lift cable do not have a transport chain.*

The transport chain supports the weight of the brush head assembly during transport between work sites and during adjustment of the spring-chain assemblies. It should remain slack during sweeping.

To adjust the transport chain:

1. Raise the sweeper.
2. Tighten the transport chain.
3. Lower the sweeper so the transport chain supports the weight of the sweeper.

OPERATION

OPERATING TIPS

Vary brush, engine and travel speeds to match sweeping conditions.

LARGE AREAS

When sweeping a large area, such as a parking lot, make a path down the middle and sweep to both sides. This reduces the amount of debris that the sweeper must sweep to one side.

SNOW

Fast brush speeds and slow travel speeds are needed to sweep snow effectively. Start at 3/4 throttle and the lowest gear of the prime mover. For wet and/or deep snow, increase to almost full throttle. This helps keep snow from packing up inside the brush hood.

NOTICE: For best sweeping results, we recommend that the swing assembly be 21” (533mm) above the ground. Failure to maintain this distance allows for swept material to be carried over the brush and back onto the swept area.

In deep snow you may need to make multiple passes to get down to a clean surface.

Always sweep with the wind at your back.

DIRT & GRAVEL

To keep dust at a minimum, use the optional dust suppression kit or plan sweeping for days when it is overcast and humid or after it has rained.

Low brush speeds and moderate travel speeds work best for cleaning debris from hard surfaces. Brush speeds that are too fast tend to raise dust.

To sweep gravel, use just enough brush speed to “roll” the gravel, not throw it.

HEAVY DEBRIS

For 2” (51mm) or more of heavy debris, a maximum brush speed in the low range and ground speeds of less than 5 mph (8 kph) are recommended.

THATCH

Low brush speeds and low prime mover speeds do the best thatching job.

To prevent the brush from pulling itself into the ground, adjust the spring-chain assembly so the bristle tips barely touch the grass.

If the brush pulls into the grass and stalls while sweeping, use the lift to raise the brush. **Do not** increase throttle to override a stall out.

Use a combination of brush speeds and ground speeds that rolls up a neat windrow.

To keep thatch from blowing back into a swept area, sweep with the wind at your back or in the direction the brush is angled.

OPERATION

WARNING! Never raise the sweeper more than a few feet off the ground. The sweeper can tip back or the prime mover can tip over causing death or serious injury.



NOTICE! Do not store the sweeper with weight on the brush. Weight will deform the bristles, destroying the sweeping effectiveness. Place the sweeper on blocks or use storage stands.

NOTICE! Do not store polypropylene brushes in direct sunlight. The material can deteriorate and crumble before the bristles are worn out. Keep polypropylene brush material away from intense heat or flame.

STORAGE

- Clean the unit thoroughly, removing all snow, dirt and grease.
- Inspect for visible signs of wear, breakage or damage. Order any parts required and make the necessary repairs to avoid delays upon removal from storage.
- Tighten loose nuts, capscrews and hydraulic connections.
- Coat exposed portions of the cylinder rods with grease.
- Lubricate grease fittings.
- Seal hydraulic system from contaminants and secure all hydraulic hoses off the ground to help prevent damage.
- Store unit in a dry and protected place. Leaving the unit outside will materially shorten its life.

Additional Precautions for Long Term Storage:

- Touch up all unpainted surfaces with paint to avoid rust.

REMOVAL FROM STORAGE

- Remove cover.
- Wash unit and replace any damage and/or missing parts.
- Lubricate grease fittings.
- Check hydraulic hoses for damage and replace as necessary.

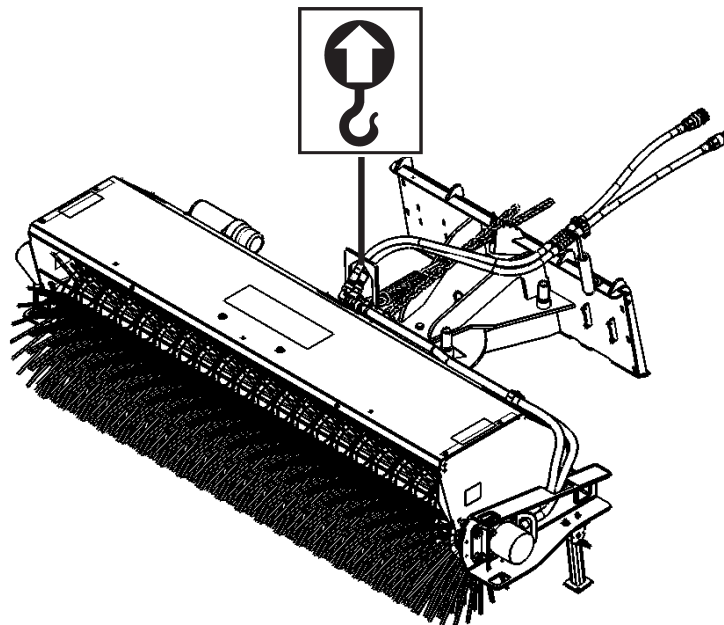
OPERATION

LIFT POINTS

Lifting points are identified by lifting decals where required. Lifting at other points is unsafe and can damage attachment. Do not attach lifting accessories around cylinders or in any way that may damage hoses or hydraulic components.

- Attach lifting accessories to unit at recommended lifting points.
- Bring lifting accessories together to a central lifting point.
- Lift gradually, maintaining the equilibrium of the unit.

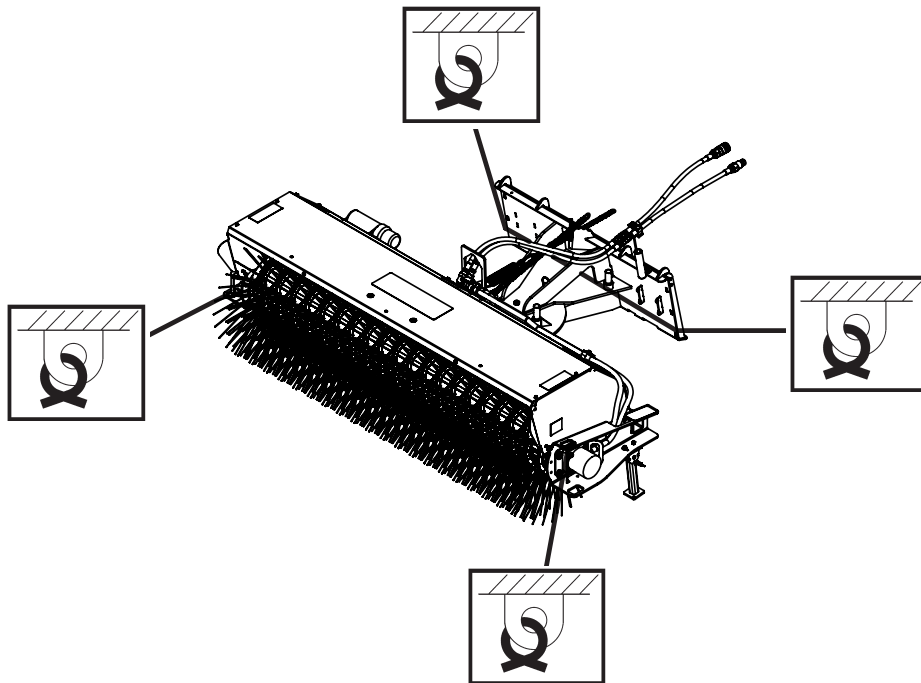
WARNING! Use lifting accessories (chains, slings, ropes, shackles and etc.) that are capable of supporting the size and weight of your attachment. Secure all lifting accessories in such a way to prevent unintended disengagement. Failure to do so could result in the attachment falling and causing serious personal injury or death.




OPERATION

TIE DOWN POINTS

Tie down points are identified by tie down decals where required. Securing to trailer at other points is unsafe and can damage attachment. Do not attach tie down accessories around cylinders or in any way that may damage hoses or hydraulic components.



- Attach tie down accessories to unit as recommended.
- Check unit stability before transporting.

WARNING!  Verify that all tie down accessories (chains, slings, ropes, shackles and etc.) are capable of maintaining attachment stability during transporting and are attached in such a way to prevent unintended disengagement or shifting of the unit. Failure to do so could result in serious personal injury or death.

TRANSPORTING

“Follow all local government regulations that may apply along with recommended tie down points and any equipment safety precautions at the front of this manual when transporting your attachment.”

MAINTENANCE

GENERAL INFORMATION

Regular maintenance is the key to long equipment life and safe operation. Maintenance requirements have been reduced to the absolute minimum. However, it is very important that these maintenance functions be performed as described below.

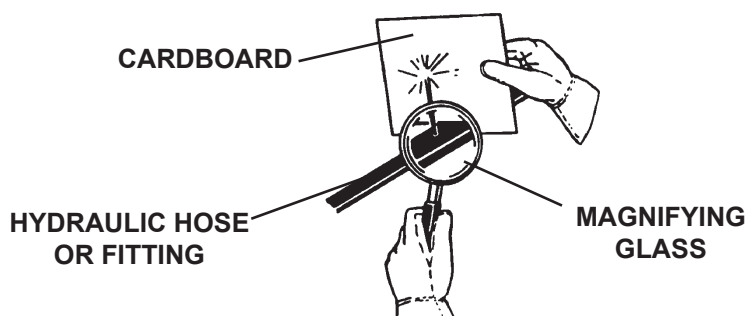
IMPORTANT: When replacing parts, use only factory approved replacement parts. Manufacturer will not claim responsibility for use of unapproved parts or accessories, and/or other damages as a result of their use.

Procedure	Daily (Every 8 Hours)	Every 50 Hours	Every 100 Hours	Every 500 Hours
Check brush pattern (See Brush Pattern Adjustment)	✓			
Check for missing or loose hardware. Replace or tighten if necessary. (See Bolt Torque Specifications)	✓			
Check for missing or damaged safety decals and replace as necessary.	✓			
Visually inspect the machine for worn parts or cracked welds, and repair as necessary	✓			
Check hydraulic system for leaks and tighten as necessary. Check for damage and replace as needed.	✓			
Check prime mover hydraulic system to ensure an adequate level and cleanliness of hydraulic oil.	✓			
Grease Swing Plate with EP2 or equivalent lubricant.		✓		
Change Hydraulic Filter Element.			✓	
Change hydraulic oil; Use ISO VG-46 oil.				✓

WARNING! Escaping hydraulic / diesel fluid under pressure can penetrate the skin causing serious injury. Fluid escaping from a very small hole can be almost invisible. Use a piece of cardboard or wood, rather than hands to search for suspected leaks.



Keep unprotected body parts, such as face, eyes, and arms as far away as possible from a suspected leak. Flesh injected with hydraulic fluid may develop gangrene or other permanent disabilities. If injured by injected fluid, see a doctor at once.



MAINTENANCE

LEVELING

Level your sweeper before each use for efficient sweeping and even brush wear.

1. Drive the unit to a level, paved area.
2. Move stands to highest position.
3. Lower the brush into the sweeping position with the weight of the brush head on the spring-chain assembly and the bristles just touching the ground.
4. Level the mounting/swing assembly using a level.
 - If the front of the assembly is high, turn the leveling screws clockwise to lower it.
 - If the front of the assembly is low, turn the leveling screws counterclockwise to raise it.

See Figure #1 for leveling screw locations.

5. With the brush head assembly straight ahead, measure from each end of the brush frame tubing to the ground. See Figure #2.
6. If the measurements are not equal, loosen hardware that attaches the brush head assembly to the swing assembly and slide the low side of the brush head assembly up in the slots on the swing assembly.
7. Repeat steps 5 and 6 until measurements are equal. Tighten the hardware.
8. Swing the brush head assembly to the right. Measure from each end of the brush frame tubing to the ground. Then, swing the brush head assembly to the left. Measure from each end of the brush frame tubing to the ground.
 - If all 4 measurements are the same, the brush head assembly is level.
 - If the measurements are not equal, adjust the mounting assembly upright. For measurements that resemble Figure #3, turn the leveling bolts counterclockwise. For measurements that resemble Figure #4, turn the leveling bolts clockwise.
9. Repeat step 8 until the brush head assembly is level.

FIGURE #1

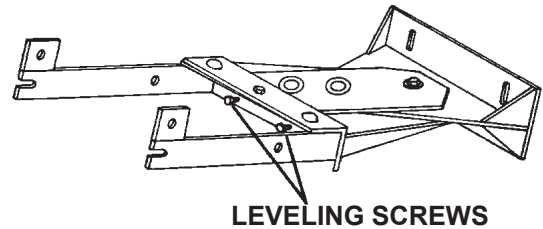


FIGURE #2

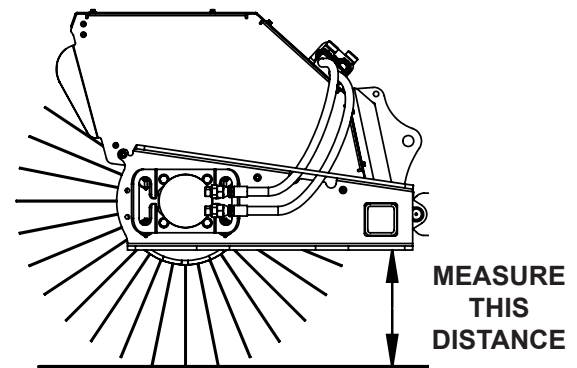


FIGURE #3

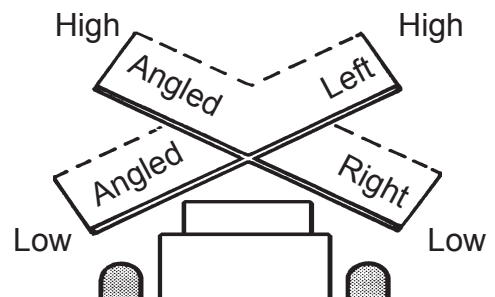
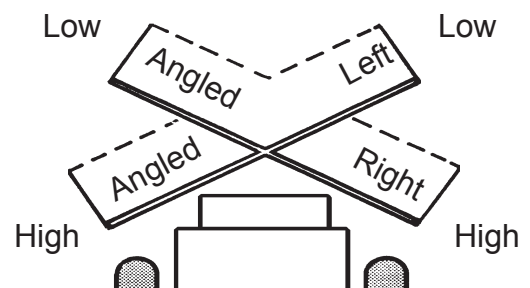


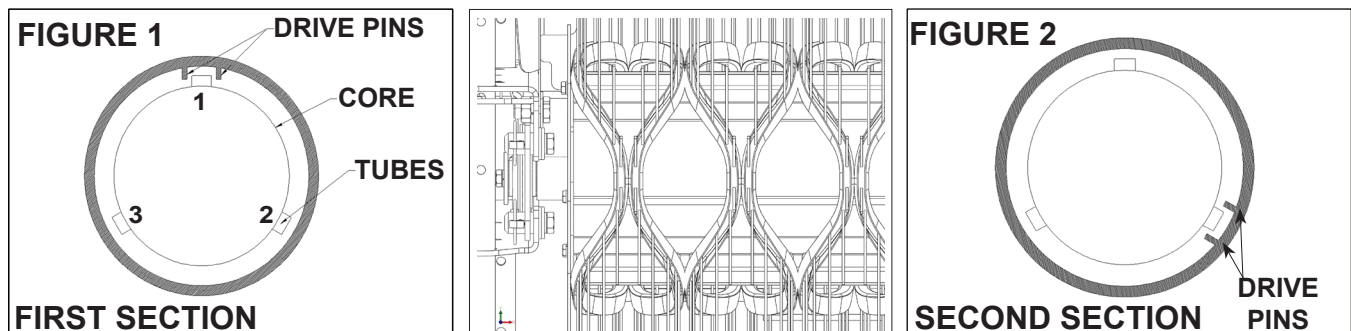
FIGURE #4



MAINTENANCE

REPLACING BRUSH SECTIONS

1. Remove motor mount lynch pins. Retain pins for reinstallation. Remove motor mount.
2. Remove motor assembly from core. Do not tangle hoses.
3. Remove bearing mount lynch pins. Retain pins for reinstallation.
4. Remove core from brush head assembly.
5. Remove retaining plate from core assembly.
6. Remove old sections.
7. Install new sections by doing the following:
 - a. Number the drive locations on the core as 1, 2, and 3. See Figure #1
 - b. Slide the first section onto the core with the drive pins on either side of tube 1. Make sure that the drive pins face up.
 - c. Place the second section on the core with the drive pins on either side of tube 2. Be sure the drive pins face down. See Figure #2
 - d. Put the third section on with the drive pins around tube 3. Be sure the drive pins face up.
 - e. Slide sections on until the core is full, making sure to alternate the tubes used and the direction of the drive pins.



8. Re-attach the section retaining plate.
9. Place the core back into the brush frame.
10. Slide motor assembly back into the core taking care not to tangle hoses.
11. Re-attach motor mount with pins removed in step 1.
12. Re-attach the bearing plate with pins removed from step 3.

WORN SECTION STANDARD				REFERENCE INFORMATION	
Section OD, New	Ring ID	Section OD, Worn	Exposed Bristle, Worn	Bristle Length	Exposed Bristle, New
24	6.38	17	3.8	8.50	7.5
26	8.00	18	4.0	9.00	8.0
32	10.00	22	5.0	11.00	10.0
36	10.00	24	6.0	13.00	12.0
36	10.63	25	6.0	12.69	11.4
46	19.38	34	6.0	13.31	12.1

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
Brush rotates wrong direction	Hoses installed incorrectly	Switch hoses at brush head tubes
Brush slows or stops when sweeping	Brush pattern too wide	Adjust brush pattern to 2"-4" (51-102mm) wide. See Brush Pattern Adjustment
	Travel speed too fast	Reduce travel speed
	Trying to sweep too much material at once	Make several passes with sweeper
	Relief pressure set too low	Set relief pressure to 2000 psi (138.0 bars)
	Pump has failed	Contact dealer to repair or replace
	Filter plugging	Change or clean filter
	Hydraulic motor is failing	Test hydraulic system. See: Troubleshooting Hydraulic Problems
Brush head assembly "bounces" during sweeping	Spring-chain assembly too loose	Adjust spring-chain assembly. See: Adjusting Spring-Chain Assembly
	Travel speed too fast and/or brush speed too slow	Find correct combination of ground and brush speeds. Do not travel at more than 5 mph (8 kph)
	Core is bent	Replace core
Brush wears into cone shape	Sweeper is not level	Level sweeper before each use. See: Leveling
	Tires on prime mover at different pressures or are different sizes	Check tire sizes and rating. Make corrections as necessary
Brush wears very quickly	Brush pattern too wide	Adjust pattern to 2"-4" (51-102mm) wide. See: Brush Pattern Adjustment
Springs on spring-chain assemblies stretching	Transport chain too loose when traveling between job sites	Adjust transport chain. See: Transport Chain
	Travel speeds too fast when sweeping	Reduce travel speed

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
Hydraulic system overheats	Hydraulic oil level too low	Add hydraulic oil to tank until it comes to 2" (51mm) from top
	Restriction in hoses	Remove bends in hoses; remove obstructions inside hoses
	Prime mover pump flow rate exceeds maximum gpm rating for broom. Back pressure exceeds BTU removal by heat exchanger.	Contact prime mover manufacturer for proper flow control method
Hydraulic quick couplers leak	Quick coupler poppet is unseated	Reseat poppet; replace quick coupler if poppet is beyond repair
Hydraulic motor seals leak	Flow rate exceeds maximum gpm rating for broom. Hydraulic pressure exceeds maximum psi rating for broom	Contact Paladin Technical Service
	Motor is failing	High number of hours on motor; Contact dealer to rebuild or replace
Hydraulic oil flows from breather cap on hydraulic tank	Hydraulic tank too full	Drain hydraulic tank until level is 2" (51mm) from top
Brush head swings too quickly	Set screw in plug on manifold loose	Loosen jam nut and then turn set screw in until it stops; turn set screw out 1 1/2 turns; tighten jam nut
Brush head swings too slowly or won't swing	Set screw in plug on manifold too tight	Loosen jam nut and then turn set screw in until it stops; turn set screw out 1 1/2 turns; tighten jam nut
Brush head swings only one direction	Set screw in plug on manifold out of adjustment	Loosen jam nut and then turn set screw in until it stops; turn set screw out 1 1/2 turns; tighten jam nut
	Dirt or debris in spools	Contact Paladin Technical Service

TROUBLESHOOTING

HYDRAULIC PROBLEMS

If hydraulic problems - which include the brush failing to rotate, the brush slowing or stopping when making contact with the sweeping surface or swing/lift cylinders not functioning - occur, complete all the following checks on the hydraulic system.

WARNING! Avoid serious injury.



Test components must have a minimum rating of 3000 psi (206.0 bars). Otherwise, components could rupture, causing serious injury. Open the gate valve before beginning any tests.

Do not operate the hydraulic system more than 5 seconds with pressure over 2000 psi (138.0 bars). Higher pressures can rupture hydraulic components and cause serious injury.

TESTING RELIEF SETTING

1. Add a flow meter, pressure gauge and gate valve on the pressure side of the sweeper hydraulic system.
2. Raise the sweeper. Then, engage the brush.
3. Shut the gate valve and note the reading on the pressure gauge.

NOTICE! Avoid pump damage. Do not run test for more than 5 seconds.

4. Refer to the prime mover manual for proper relief setting. If the pressure gauge reading does not match manufacturer's recommendations, take the prime mover to your dealer for repair.
5. Go to Testing Power Pack Hydraulic Pump or refer to your prime mover manual on hydraulics.

TESTING POWER PACK HYDRAULIC PUMP

Complete the following steps to test the pump on units with a power pack.

1. Place a pressure gauge, flow gauge and gate valve between the pump and the pressure line on the brush frame.
2. Make sure the prime mover is in Neutral with the parking brake on. Start the prime mover at idle and engage the sweeper.
3. Raise engine speed to normal operating rpm.
4. Note the reading on the flow gauge. Then, shut the gate valve. Note the reading on the pressure gauge.
 - If the flow gauge reads at least 10 gpm (.63 lps) and the pressure gauge reached 2000 psi (138.0 bars), the pump is functioning properly.
 - If the flow and/or pressure did not reach the proper reading, the pump has failed. Take it to your dealer to have it rebuilt or replaced.
5. Remove the pressure gauge, flow gauge and gate valve and reconnect hoses.
6. Go to Testing Sweeper Motors.

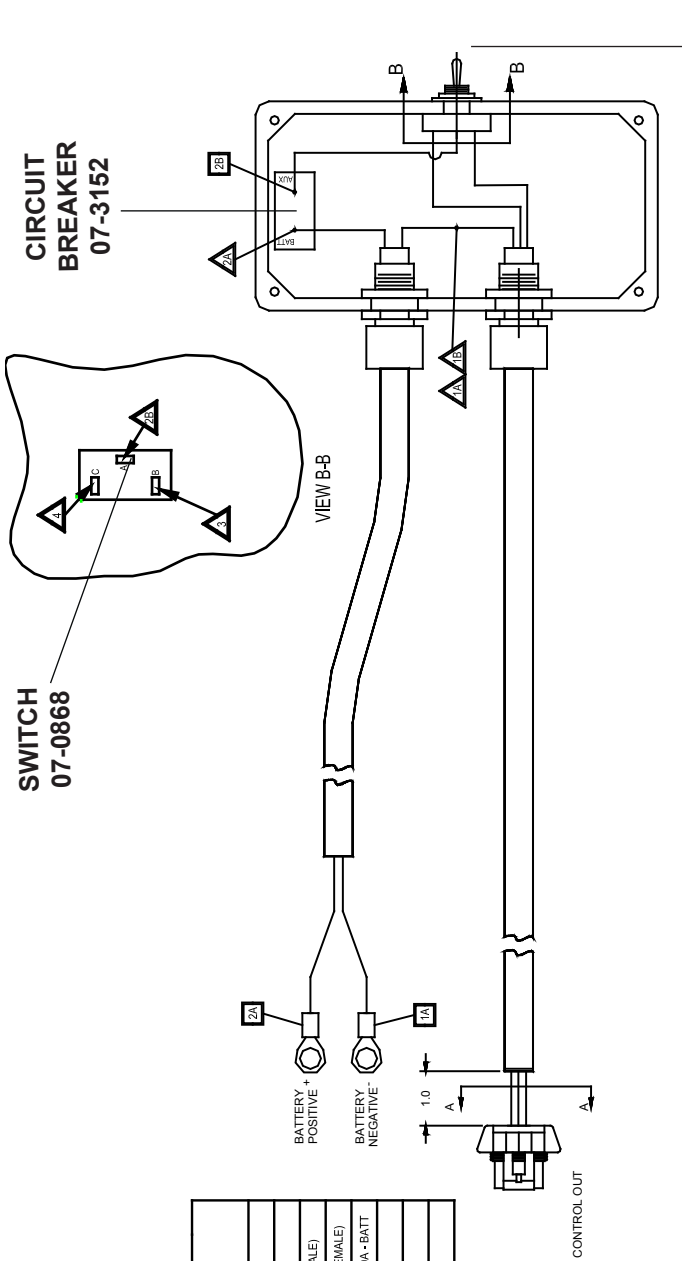
TESTING SWEEPER MOTORS

1. Place a pressure gauge and flow gauge between the sweeper or prime mover hydraulic tank and the return line on the brush frame.
2. Make sure the prime mover is in Neutral with the parking brake on. Start the prime mover at idle and engage the sweeper. Then, adjust the brush to the maximum sweeping pattern.
3. When the brush stalls, note the reading on the flow gauge. If it is 3 gpm (.19 lps) or more, the motor(s) need(s) to be replaced.

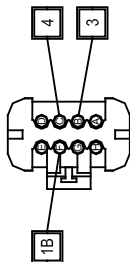
TROUBLESHOOTING

Serial Number 1118199 & Down

WIRING HARNESS



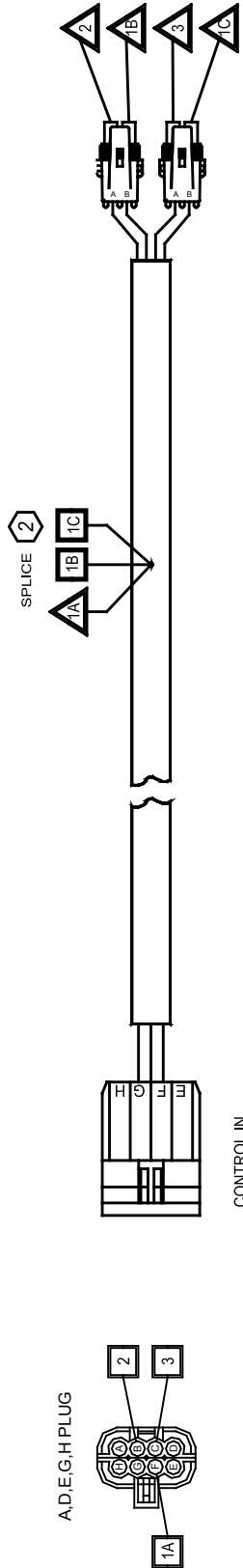
LAF9444 WIRE HARNESS		APPLICATION	
WIRE NO.	GUAGE	FROM	TO
1A	16	BATTERY +12V	SPADE TERMINAL (MALE)
1B	16	PACKARD CONN. PIN F	SPADE TERMINAL (FEMALE)
2A	16	BATTERY +	CIRCUIT BREAKER 10A - BATT
2B	16	CIRCUIT BREAKER 10A - AUX	SWITCH 1-A
3	16	PACKARD CONN. PIN B-DEPTH	SWITCH 1-B
4	16	PACKARD CONN. PIN C-TILT	SWITCH 1-C



PLUG - A, D, E, G & H

VIEW "A-A"

LAF9441 WIRE HARNESS		APPLICATION	
WIRE NO.	GUAGE	FROM	TO
1A	16	BLACK	ULTRA SONIC SPLICE
1B	16	BLACK	PACKARD 1 PIN B
1C	16	BLACK	PACKARD 2 PIN B
2	16	RED	PACKARD 1 PIN A
3	16	YELLOW	PACKARD 2 PIN A



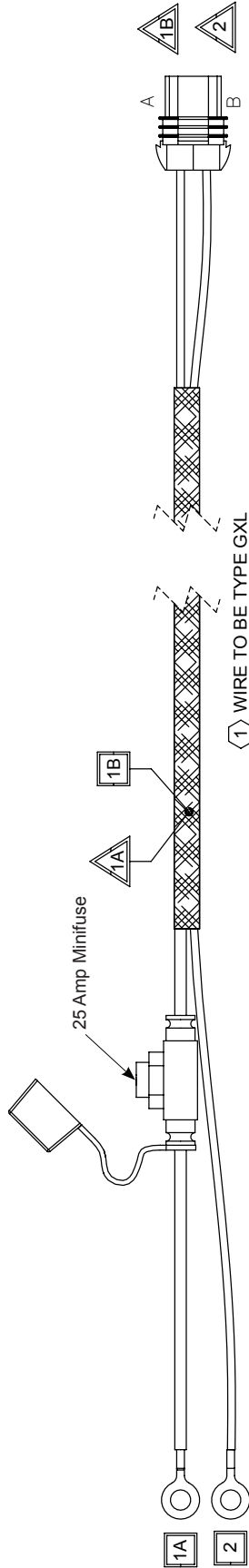
WIRING HARNESS

TROUBLESHOOTING

Serial Number 1119001 & Up

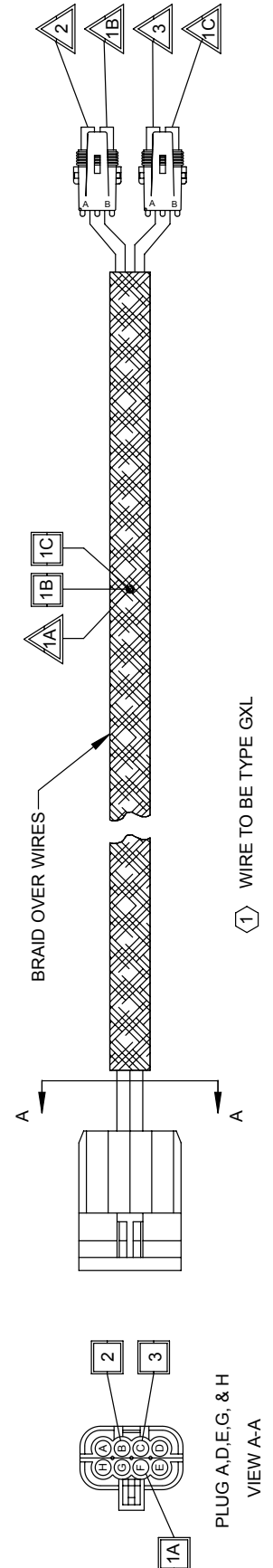
07-7733

WIRE NO.	GAUGE	IDENTIFICATION			APPLICATION			END (LEFT) (BEYOND HARNESS)				END (LEFT) (BEYOND HARNESS)			
		FROM	TO	TYPE	SIZE	TYPE	TYPE	EXTRA WIDE PROTECTION		EXTRA WIDE PROTECTION		EXTRA WIDE PROTECTION			
								YES	NO	YES	NO	YES	NO		
1A	12	BATTERY (+)	ULTRA SONIC SPLICE	0.38	RING TERMINAL (WAYTEK # 32205)	-	X	-	X	-	-	-	X	1A	
1B	12	ULTRA SONIC SPLICE	PACKARD PIN A	-	ULTRA SONIC SPLICE	-	X	-	X	-	-	-	X	1B	
2	12	BATTERY (-)	PACKARD PIN B	0.38	RING TERMINAL (WAYTEK # 32205)	-	X	-	X	-	-	-	X	2	



07-7737

WIRE NO.	GAUGE	IDENTIFICATION		APPLICATION		END (LEFT) (BEYOND HARNESS)				END (RIGHT) (BEYOND HARNESS)				
		FROM	TO	TYPE	TYPE	SIZE	TYPE	TYPE	EXTRA WIDE PROTECTION		EXTRA WIDE PROTECTION			
									YES	NO	YES	NO		
1A	16	BLACK	PACKARD PIN F	ULTRA SONIC SPLICE	PACKARD 12045773 & SEAL	-	X	-	X	-	-	-	X	1A
1B	16	BLACK	ULTRA SONIC SPLICE	ULTRA SONIC SPLICE	ULTRA SONIC SPLICE	-	X	-	X	-	-	-	X	1B
1C	16	BLACK	ULTRA SONIC SPLICE	ULTRA SONIC SPLICE	ULTRA SONIC SPLICE	-	X	-	X	-	-	-	X	1C
2	16	RED	PACKARD PIN B	DEUTSCH 1 PIN A	PACKARD 12045773 & SEAL	-	X	-	X	-	-	-	X	2
3	16	YELLOW	PACKARD PIN C	DEUTSCH 2 PIN A	PACKARD 12045773 & SEAL	-	X	-	X	-	-	-	X	3

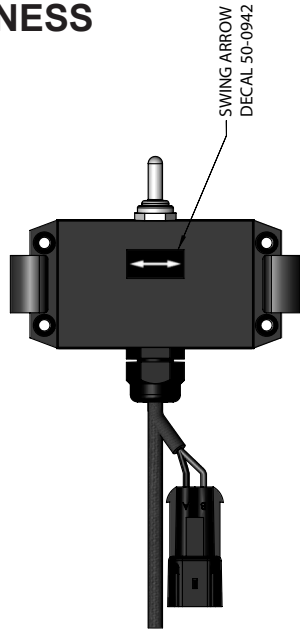


WIRING HARNESS

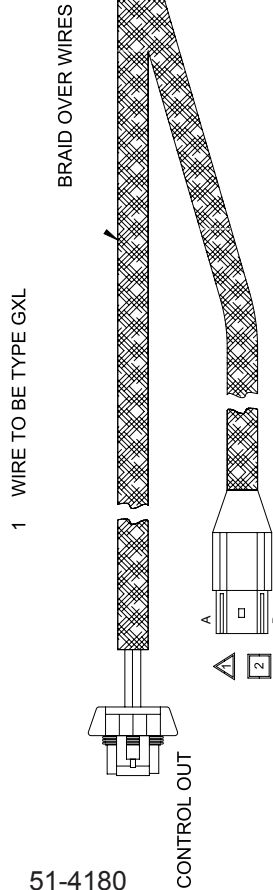
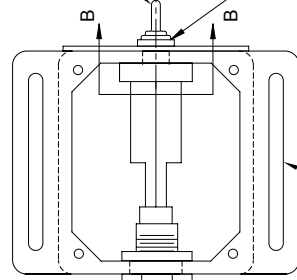
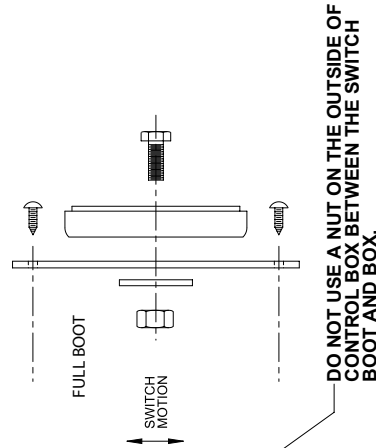
TROUBLESHOOTING

Serial Number 1119001 & Up

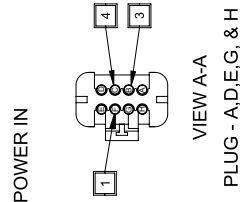
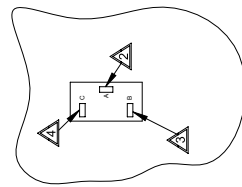
07-7734



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	FROM	TO	SIZE	TERMINAL	EXTRA WIDE PROTECTION	TERMINAL	EXTRA WIDE PROTECTION	
1	BLACK	PACKCARD PIN F (8-PIN) PACKCARD PIN A (2-PIN)	-	PACKCARD T2048159 & SEAL	-	PACKCARD T2048074 & SEAL	-	PACKCARD T2048074 & SEAL
2	RED	PACKCARD PIN B (2-PIN) SWITCH 1-A	-	PACKCARD T2048159 & SEAL	-	SPADE TERMINAL (FEMALE)	-	SPADE TERMINAL (FEMALE)
3	RED	PACKCARD PIN B (8-PIN) SWITCH 1-B	-	PACKCARD T2048074 & SEAL	-	SPADE TERMINAL (FEMALE)	-	SPADE TERMINAL (FEMALE)
4	YELLOW	PACKCARD PIN C (8-PIN) SWITCH 1-C	-	PACKCARD T2048074 & SEAL	-	SPADE TERMINAL (FEMALE)	-	SPADE TERMINAL (FEMALE)

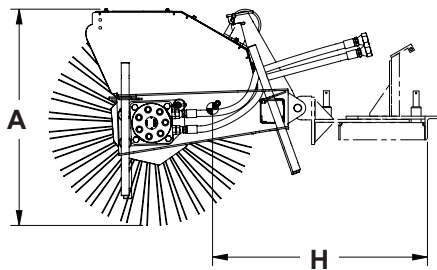
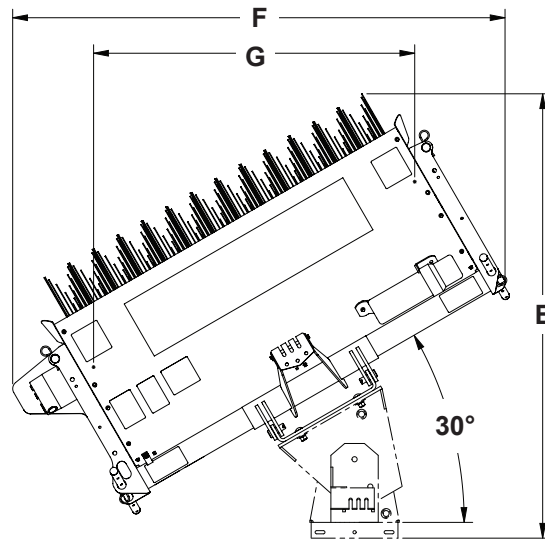
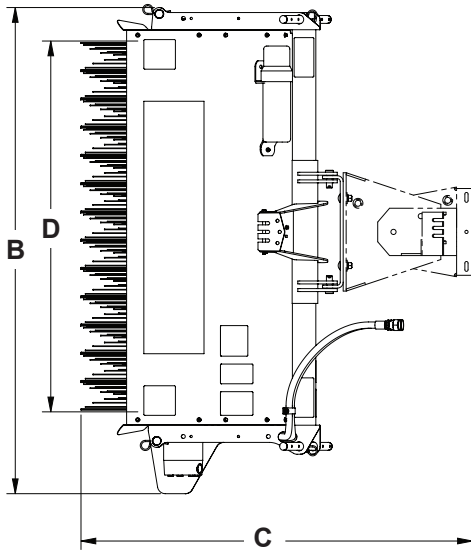


FLANGE W/ SLOT FOR VELCRO MOUNTING STRAP



VIEW A-A
PLUG - A,D,E,G, & H

SPECIFICATIONS



**SPECIFICATIONS AND DESIGN ARE
SUBJECT TO CHANGE WITHOUT NOTICE
AND WITHOUT LIABILITY THEREFOR.**

DESCRIPTION	S26 SWEEPER	4'	5'	6'
A. Overall Height		27.40"	27.40"	27.40"
B. Overall Width		59.40"	71.40"	83.40"
C. Overall Length		49.60"	49.60"	49.60"
D. Sweeping Width		48.00"	60.00"	72.00"
E. Overall Length @ 30° Angle		56.30"	59.30"	62.30"
F. Overall Width @ 30° Angle		62.40"	72.80"	83.20"
G. Sweeping Width @ 30° Angle		41.60"	52.00"	60.40"
H. Center of Gravity		27.50"	27.60"	27.70"
Weight (lbs)		265#	305#	340#
Hydraulic Flow - Single 15 CID Motor				8-15 GPM
Hydraulic Flow - Single 18 CID Motor				10-18 GPM
Maximum Pressure				3000 PSI

DESCRIPTION	S30 SWEEPER	4'	5'	6'	7'
A. Overall Height		32.30"	32.30"	32.30"	32.30"
B. Overall Width		61.80"	73.80"	85.80"	97.80"
C. Overall Length		53.60"	53.60"	53.60"	53.60"
D. Sweeping Width		48.00"	60.00"	72.00"	84.00"
E. Overall Length @ 30° Angle		59.80"	62.80"	65.80"	68.80"
F. Overall Width @ 30° Angle		63.10"	73.50"	83.90"	94.30"
G. Sweeping Width @ 30° Angle		41.60"	52.00"	62.40"	72.80"
H. Center of Gravity		29.00"	29.50"	29.90"	30.20"
Weight (lbs)		300#	340#	380#	415#
Hydraulic Flow - Single 15 CID Motor					8-15 GPM
Hydraulic Flow - Single 18 CID Motor					10-18 GPM
Maximum Pressure					3000 PSI




BOLT TORQUE SPECIFICATION

GENERAL TORQUE SPECIFICATION TABLES

Use the following charts when determining bolt torque specifications, when special torques are not given. Always use grade 5 or better when replacing bolts.




SAE BOLT TORQUE SPECIFICATIONS

Note: The following torque values are for use with extreme pressure lubricants, plating or hard washer applications. Increase torque 15% when using hardware that is unplated and either dry or lubricated with engine oil.

Bolt Size		SAE GRADE 5 TORQUE				SAE GRADE 8 TORQUE				Bolt head identification marks as per grade. NOTE: Manufacturing Marks Will Vary
		Ft-lbs		Newton-Meter		Ft-lbs		Newton-Meter		
Inches	mm	UNC	UNF	UNC	UNF	UNC	UNF	UNC	UNF	
1/4	6,35	8	9	11	12	10	13	14	18	<p>Grade 2</p>  <p>Grade 5</p>  <p>Grade 8</p> 
5/16	7,94	14	17	19	23	20	25	27	34	
3/8	9,53	30	36	41	49	38	46	52	62	
7/16	11,11	46	54	62	73	60	71	81	96	
1/2	12,70	68	82	92	111	94	112	127	152	
9/16	14,29	94	112	127	152	136	163	184	221	
5/8	15,88	128	153	174	207	187	224	254	304	
3/4	19,05	230	275	312	373	323	395	438	536	
7/8	22,23	340	408	461	553	510	612	691	830	
1	25,40	493	592	668	803	765	918	1037	1245	
1-1/8	25,58	680	748	922	1014	1088	1224	1475	1660	
1-1/4	31,75	952	1054	1291	1429	1547	1700	2097	2305	
1-3/8	34,93	1241	1428	1683	1936	2023	2312	2743	3135	
1-1/2	38,10	1649	1870	2236	2535	2686	3026	3642	4103	

METRIC BOLT TORQUE SPECIFICATIONS

NOTE: The following torque values are for use with metric hardware that is unplated and either dry or lubricated with engine oil. Reduce torque 15% when using hardware that has extreme pressure lubricants, plating or hard washer applications.

Bolt head identification marks as per grade.		
		

Bolt Size	Grade No.	Pitch (mm)	Ft-lbs	Newton-Meter	Pitch (mm)	Ft-lbs	Newton-Meter
M6	5.6	1,0	3.6-5.8	4.9-7.9	-	-	-
	8.8		5.8-4	7.9-12.7		-	-
	10.9		7.2-10	9.8-13.6		-	-
M8	5.6	1,25	7.2-14	9.8-19	1,0	12-17	16,3-23
	8.8		17-22	23-29,8		19-27	25,7-36,6
	10.9		20-26	27,1-35,2		22-31	29,8-42
M10	5.6	1,5	20-25	27,1-33,9	1,25	20-29	27,1-39,3
	8.8		34-40	46,1-54,2		35-47	47,4-63,7
	10.9		38-46	51,5-62,3		40-52	54,2-70,5
M12	5.6	1,75	28-34	37,9-46,1	1,25	31-41	42-55,6
	8.8		51-59	69,1-79,9		56-68	75,9-92,1
	10.9		57-66	77,2-89,4		62-75	84-101,6
M14	5.6	2,0	49-56	66,4-75,9	1,5	52-64	70,5-86,7
	8.8		81-93	109,8-126		90-106	122-143,6
	10.9		96-109	130,1-147,7		107-124	145-168
M16	5.6	2,0	67-77	90,8-104,3	1,5	69-83	93,5-112,5
	8.8		116-130	157,2-176,2		120-138	162,6-187
	10.9		129-145	174,8-196,5		140-158	189,7-214,1
M18	5.6	2,0	88-100	119,2-136	1,5	100-117	136-158,5
	8.8		150-168	203,3-227,6		177-199	239,8-269,6
	10.9		175-194	237,1-262,9		202-231	273,7-313
M20	5.6	2,5	108-130	146,3-176,2	1,5	132-150	178,9-203,3
	8.8		186-205	252-277,8		206-242	279,1-327,9
	10.9		213-249	288,6-337,4		246-289	333,3-391,6

PARTS

In order to provide you with the most UP-TO-DATE part information, all parts for this attachment have been moved to our website at www.paladinattachments.com/Manuals. Please use these diagrams and parts lists to locate replacement parts.

When servicing your attachment, remember to use only original manufacturer replacement parts. Substitute parts may not meet the standards required for safe, dependable operation.

To facilitate parts ordering when contacting the factory, please have the product control number (PCN or C/N) or model and serial number of your product ready to ensure that you receive the correct parts for your specific attachment.

The product control number, model and serial number for your attachment should be recorded in the space provided on the cover of this manual. This information may be obtained from the serial number identification plate located on your attachment.

NOTE: Most daily and emergency parts orders (in stock) received by 10:30 A.M. (Eastern Standard Time) will be shipped UPS Ground the same day received. UPS Next Day orders must be received by 1:30 PM (Eastern Standard Time.)

SERVICE DEPARTMENT

(734) 996-9116

(800) 456-7100

For Fax and E-mail Orders

PLC_Sales@paladinattachments.com

(734) 996-9014

WARRANTY

In order to provide you with the most UP-TO-DATE Warranty information, Paladin Warranty Statement and Warranty Procedures along with Warranty Registration and Claim Forms have been moved to our website at www.paladinattachments.com.

